NEW RADIATION, POSSIBLY. ANYTHING CAN HAPPEN AT SEA. FREEZING WEATHER DOES NOT FORGIVE MISTAKES. DISQUIETING WORK

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"New [illegible] ? Possibly"

By Engineer-Major A. Baksanskiy,
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Starshina Serzhant, No. 2, 1967, pp. 30-31

Submarines Hear, But...

Sensation: "Atomic submarine 'Nautilus' passed under the Arctic ice!...'Triton' circumnavigated the world submerged!"

Sensation!!!

We leave the sensational ballyhoo to the conscience of American propaganda. But there is evidence of progress in submarine construction throughout the world. Atomic reactors coupled with new means of regeneration have radically altered the characteristics of submarines.

Now no one is surprised to hear that submarines reach a submerged speed of 55 kilometers or more per hour or that they can go around the world without once surfacing. And all this has been achieved during the last 10 to 15 years! But...

It appears that submarines, if surfaced (or at periscope depth), can use all available aids of radar, radio communications and radio navigation; if deeply submerged, they are deprived of such means.

[illegible] Several years after the invention of radio by A. S. Popov, scientists found out that radio waves propagate well in insulators and very poorly in conductors. Air

is an excellent insulator; water, particularly salt water, is a conductor. That is why radio waves "don't want" to penetrate to the depths of the sea.

The rapid growth or the submarine fleet and its enormous combat potentialities caused scientists to look for a way "to drive" radio waves through the water thickness.

Nevertheless, several decades passed before ships started to hear something under water. Radiowaves of long wavelength came to their aid. It turned out that such waves could effectively penetrate from the surface to the depths of the water; the longer the wavelength, the greater the depth penetrated. For example, if a wave of 50 cm. in length penetrated the water to a few centimeters, then waves of 30 km. in length will penetrate to 10-15 meters.

Very long wave shore radio stations were built especially for one-way transmissions to submerged submarines. The power of these stations is several tens of thousands of kilowatts. Radio transmitters of similar power are used, for example, in the American "Fox" system for communication with missile-launching submarines. These stations are located along the coast of the U,S .A., in the Panama Canal Zone, and in the Hawaiian Islands, A transmitter of 81000 kw. is being completed in northwestern Australia.

Nevertheless, it is one way communications: from shore to ship. The power of the transmitters is so [illegible] size of the transmitting antenna so [illegible], that it is [illegible] to install them on submarines. Therefore, very long waves can

only be used for communications from shore to ship.

This kind of wave is widely used in radio navigation; i.e., for advising submarines of their location at sea. The U.S. Navy uses "Loran-C", "Redax" and "Omega" navigation systems.

As can be seen, radio waves help solve only some of the problems of communication and navigation. Apparently, nothing more can be expected of them. Long waves have turned out perfectly useless for the use of radar in air, let alone in water.

And yet the scientists found a way out, using sound and ultra sound waves. As we know, they pass through water better than through air. Based on these factors, underwater listening devices and sonar were developed and are widely used in all the navies of the world.

It is true, this devices have substantial shortcomings. In the first place, the performance of the underwater listening devices and of sonar depend in great part on the whims of the sea since the density, temperature, and salinity of the water greatly affect the propagation of sound. Therefore, now and then confusion arises when the same station picks up no sound at all or detects a target at a distance greater than its normal range. In the second place, the range of equipment used for active detection is always limited. Nevertheless, at first it fully satisfied the sailors.

Time passed. The speed and submerged depth of submarines increased, [illegible] were added to them, and [illegible] behind the demands that were being made on them. And all of this in spite of the fact that their range

had increased ten times since the Second World War.

Scientists and engineers had to look for types of emission . that would be carried through water better than sound or radio waves.

Why Is A Green Laser Necessary?

It is interesting that the first experiments in speech transmission via light beams had taken place as far back as 1880. That is, before the invention of the radiotelephone. Before the Second World War land forces had already begun to use the optical telephone. Nevertheless, it required almost 30 years more to develop emitters . and receivers of light energy suitable for detection and communications underwater. This became possible in the years following the invention of the laser (optical quantum generators--OKG).

The laser is different from other sources of light in that it creates a sharply aimed " beam " of light which can be focused. For example, 10 km. from the OKG the width of the ray does not exceed 50 cm. If it is directed at a lense one half meter in diameter, almost all the energy emitted from the OKG converges at the focus of the lens.

The peak power of the OKG reaches millions of kilowatts which, together with its capability to create sharply directed beam , provides the great range of the lasers. They were used several years ago to "illuminate" the surface of the moon. During this experiment, scientists not only measured more precisely the distance to our heavenly neighbor, but also determined the height

of the lunar mountains and the depth of the craters.

They tried to test it under water. Nothing happened. The infrared rays and the red light on which the laser works in air were completely absorbed by the sea water. The range of the OKG under water turned out to be very short; so short in fact that it was of no practical use.

We all know that sea water looks green or blue. Why? Because blue-green rays penetrate best. In that case, it was decided to develop an OKG which worked on the blue-green portion of the spectrum. Such lasers were developed on a glass base with the addition of Gadolinium or Neodymium. The first of these were quite imperfect; they developed a peak power of a few kilowatts. Now it has increased to millions of watts. It has become possible to use the OKG for detection and communications.

It is believed that OKG detector can find underwater targets at a distance of several kilometers which greatly exceeds the range of television cameras which is about 140 meters. But this is a great deal less of the range of modern sonar. Scientists found this defficiency in using the OKG as a means of communication.

The truth is that lasers still have not emerged from their "adolescence", but they do have a great future. But now scientists foresee great difficulties in using them under water. It can be explained as follows: as the light passes through the water its energy is greatly scattered by particles suspended

in the water and is absorbed by dissolved salts. Thus the OKG, with all of its positive qualities, is unlikely to be capable of ensuring communications and detection over sufficiently great distances which are necessary to meet current levels of development of combat equipment.

What Is the Solution?

Nature herself prompted it. In observing fish and sea life, scientists found that many inhabitants of the ocean depths "converse" with one another over great distances. The "vocabulary" of the dolphins is quite rich. They can emit sounds that convey fear or discontent or can call for help from their kin. The dolphins searching for prey give off totally different sounds.

It was recently established that some species of fish could use the "hydrophone". So, in an experiment the fish were given a painful shock with an electric current. The fish began to "scream". In a short time sharks gathered at the place of the experiment, clearly "having taken a bearing" on the sounds emitted by the fish which had gotten into trouble and had lost mobility.

The most interesting feature of the natural "sonar" and "transmitters" of fish is that their great ranges are achieved with a very small amount of power from their biological energy source.

An American scientist, Wallace Minto, turned his attention to this subject. He had for a long time occupied himself with the study of the communication and [illegible] processes in fish. Minto discovered that some kinds of fish emit waves which penetrat

water as well as radio waves penetrate air. They were called "hydronic" waves. In the course of Minto's prolonged research, an apparatus was built for the emission and reception of these waves and for conducting a series of experiments to discover whether hydronic waves really were appropriate for transmitting under water over great distances. To the extent that magazine articles can be used for evaluation, it seems that hydronic waves have justified the hopes placed in them. It has been shown, for example, that a transmitter with a power of 0.1 watt provided communication over a distance of 200 meters; transmitters of greater power reached ranges of up to 50 kilometers. The hydronic signals of fish were successfully received over distances almost up to a kilometer.

It is interesting that researchers experimented with waves of very different lengths--from very long- to ultrashort-waves of 5.5 meters in length. After a few months an announcement was made of still another type of radiation which was similar to the hydronic. The new type of radiation was called plasmonic. Hydronic or plasmonic radiation can pass through water and air. The difference between them is that hydronic waves freely pass from water to air, but plasmonic waves need a special conducting adapter to cross the dividing boundary between the water and air. The speed of hydronic and plasmonic waves is many times that of sound and, apparently, close to the speed of light.

In one of his experiments, Minto gave a practical demonstration of receiving signals emitted by an underwater transmitter to an antenna in the air. Like radiowaves, hydronic and plasmonic waves radiate from antennas tuned to transmitters;

however, in contract to radiowaves, hydronic and plasmonic waves radiate in the direction of the longitudinal axis of the antenna (radiowaves usually do not radiate in this direction).

In his experiments Minto used plates of stainless steel or of nickel alloy as transmitting antennas. The receiving apparatus differed from the conventional one but the nature of the difference was not specified in the report.

No doubt, the Americans propose to use the results of the new research for other than strictly peaceful purposes. That is why in reports about hydronic and plasmonic emissions many important details are missing and almost nothing is said about the physical nature of the new kind of emission. It is true that Minto himself considers that the new form of energy is radiation which has nothing in common with sound waves.

In conclusion it must be noted that publications of foreign technical journals which touch on hydronics and plasmonics must not be considered by the Soviet reader as completely true. There is clearly a smell of publicity in them (to which, by the way, Minto himself is no stranger) as well as straight contradictions and discrepancies. However, from all of these materials it undoubtedly follows that foreign specialists are searching for new information appropriate for underwater communications and location.

"Anything Can Happen At Sea"

By Engineer-Captain 3rd rank N. Burkov

Starshina Serzhant, No. 2, 1967, p. 32

The salvage and sea rescue service is provided with underwater television, underwater sound communications, and accoustical equipment to hear noises in compartments of /submerged/ submarines on the surface. Special ships are equipped with the latest equipment for maintaining the vital activities of the crew of a sunken submarine as well as for bringing the men to the surface. The later is carried out through the so called "dry" method by which the submariners transfer directly from the compartments of the submarine to the diving bell without diving equipment and without undergoing the enormous pressure of the water.

Experienced deep sea divers serve on board of these ships; they are great experts at their jobs. The delegate to the 15th Conference of the All-Union Lenin's Young Communist League, Warrant Officer Denisenko, Chief Petty Officer Marchenko, Petty Officer 1st class Pridyba, Seaman Golobashvili, and many, many others proudly carry out their duties. In one word, they, the rescuers, are always ready to go to the help of whoever needs it. But success does not always depend on them alone.

Every submarine is outfitted with a great number of salvage and rescue arrangements (SRA). They are there so that, in rendering help to sumariners, we can fully utilize our equipment. The overwhelming majority of submarine crews are well aware of the importance of the SRA. However, there are petty officers and sailors who regard the equipment with disdain and do not keep it in good order.

Such careless attitude toward the SRA by part of the personnel can, apparently, be explained by the fact that some submariners think, for example: "Let something happen to us at sea--some chance of rescue!" It is simply not so... Over the last few years a large number of studies have been carried out on the emergence of personnel from submarines "sunk" in deep water far in excess of the 100-meter limit. All of them turned out successfully.

Perhaps the problem stems from the fact that we badly publicize our achievements and the equipment available to us. This in some measure accounts for the absolute reliability of our submarine construction. Great emergencies do not happen so people stop feeling the importance of salvage and rescue equipment. Therefore, they maintain the equipment often with a disregard for basic requirements.

It has happened that, because of the poor condition of their SRA, submarines have been prohibited from going to sea. This happened, for example, to the submarine of Senior Warrant Officer Ganay and Petty Officer 1st class Grigor'yev.

It would seem that trivial violations could lead to very serious consequences. In one of the drills for rendering help to a "sunken" submarine, a long delay occurred--the emergency signal buoy did not pop to the surface after its release. Afterwards, in the critique, it was discovered the crew had carelessly packed the cable which got tangled up when the buoy was [illegible]. Fortunately this happened [illegible]

Violations in maintaining the SRA are, generally,

of the same type. Therefore, let us discuss the ones most often encountered.

First is the poor sound over the buoy telephone. It results from moisture in parts of the microphone tube, a decrease in the resistance of the insulation in the switch box, or the rusting of the connecting coupling for the cable extenders. But if the tube is placed in a rubberized bag that is tightly closed, if the buoy shaft is regularly ventilated, and if silica gel or dry common salt (one or two glassfuls) is placed at the base of the shaft, the sound will always be excellent.

The outer hull of a submarine has a large number of SRA compartments closed by lids on bolts. Opening these lids is sometimes difficult on the surface. What can we then say about the depths where a diver finds it difficult to move and the amount of time he can remain at the spot is counted in minutes? Once, when a diver could not open the rusty bolts, he secured a steel cable to the lid and broke it. A great deal of precious time was wasted.

Similar facts were found on submarines where Chief Petty Officer Petrenko and Petty Officer 1st class Syranyy were responsible for the SRA. Yet working loose the rusty bolts a little bit every day would not seem to be so complicated as all that.

Often the running line of the rescue bell where it connects to the swivel and ring of the coamings-platform is worn or rusty. This means that it is not greased and the swivel is not

disconnected from the eye-bolt during moorings at the base.

Sometimes in place of the regular copper washer, the men place rubber or __**__ ones on the slip-on nuts of the SRA connecting pipe. But when they tighten the nut they cut through the rubber and __***__ and choke the pipe. Excessive lubrication of the pipes can cause serious consequences if an oil block occurs in the main.

During one drill a submarine could not receive compressed air from a rescue ship because of a defective pipe.

Besides the SRA already mentioned, submarines contain equipment and means for personnel to leave the compartments of sunken boats without assistance. It ought to be noted that submarines are now equipped with self-contained escape equipment (ISP). The regulations for its use are quite simple. Practically nothing is required from the submariner except the ability to turn on the apparatus. The automatic breathing device does the rest for him. A water suit inflated with air from special cylinders makes it possible for a man to remain for a long time on the surface without fear of supercooling his body.

Is it worth mentioning that careful maintenance and upkeep of the ISP by submariners are questions of paramount importance? Nevertheless, there are cases where a check turns up that the gas pressure in the ISP cylinders is below permissible [illegible]

** Translation of the word "paranitovyy" (adj. form) could not be found
*** Translation of the word "paranit" (possibly noun form) could not be found

the canisters of the cylinders for the water suits are not well charged with compressed air, and woolen diving clothing is missing.

Trying somehow to justify their lack of concern, some submariners claim, for example, that there is no special device for filling the canisters with air. But they know very well that for a long time on most submarines in being used a simple coupling from a central point in the high pressure air system.

What are the reasons for such shortcomings? One is the weak control over the condition and security of the gear by frogmen. For example, warrant Officers Tverdokhleb, Gurov, Reshetnikov, Grishin, and Chief Petty Officer Konovalov are experienced divers who have chalked up hundreds and even thousands of hours of work under water. And to train submariners in the correct maintenance of the special equipment is a matter of honor for them.

The atomic submarine "Leninskiy Komsomol" is an example of model maintenance of salvage and rescue equipment and self-contained equipment. There was not one case which produced even the slightest charge against a member of the crew.

In conclusion, let's look at a curious episode. In a drill a group of sailors was being led out of a submarine lying in deep water by means of a rescue bell. Among them was the head of damage control group. Spitting from the sunlight, the Chief Petty Officer glanced around in delight and said:

"I never thought it was so easy to exit from a great depth. From now on I will force my men to tend the salvage and rescue equipment carefully!"

And I am fully convinced that he will keep his word.

"Freezing Weather Does Not Forgive Mistakes"

By V. Lepikov, Captain, Technical Service

Starshina Serzhant, No. 2, 1967, p. 33

In winter the maintenance of mobile military electric power stations ESD-50 VS/230, and ESD-75 VS/230 has its own peculiarities. First of all it applies to diesel engines. During low temperatures starting is hampered, conditions worsen the operation of the storage batteries, and winter type fuel ("DZ" and "DA") and oil, and low-freezing cooling liquid are necessary.

Starting the engines is difficult first of all because of the rise in viscosity (thickness) of the oil, the deterioration of conditions for the formation and ignition of the working mixture, and the lowering of the efficiency of the starter mechanism. Turning over the crankshaft of an engine during low temperatures requires power from the starter and, consequently, current of great strength must be provided by the storage battery.

One day private V. Vasel'yev found that the starter wouldn't work. It turned out that the storage battery had not been charged for a long time. And since it was not warmed, the temperature of the electrolite dropped and the starter did not receive sufficient current.

Our experience shows that storage batteries from mobile electric power stations must be kept in a warm dry place. Discharging of a battery in winter in excess of 25% is unacceptable.

Owing to the expansion and contraction of metals at different temperatures, a heavy frost will reduce the clearance of the crankshaft in the bearings.

To start an engine r pidly in low temperatures and to lubricate the bearings well, only winter oil MS-14 or universal MT-16P should be used. Before starting it is necessary to heat the engine systems with individual heaters. If not, then fill the engine with hot coolant and oil.

One day private N. Gushan, in temperature of -25° C., heated an engine with heaters. Making certain that the instruments showed an oil temperature of +40° C., the soldier started the engine. Unexpectedly, a leak was discovered in the pipe joint of the oil line from the lower crankcase to the condenser. The soldier spent quite a bit of time before he found the cause of the trouble. He himself was to blame--during the conversion of the equipment to autumn-winter use, he replaced the summer lubricant with winter one only in the main tank. But in the lower crankcase and condenser he left the old type. Since the MS-20 summer oil is more viscous than the MS-14 winter oil, the pressure in the oil line sharply rose and the fastening of the crankcase did not hold.

Preparing for winter, junior sergeant S. Stepanov did not fill, as required, the fuel pump regulator with a mixture of diesel fuel and MS-14 oil in equal proportions. After a time he noticed that the engine of the [illegible] ASD-50 V3/200 was not developing maximum revolutions.

It is very important to use the spray heater regularly. One must be careful that the spirals of the incadescent bulb do not burn out, that the plunger does not jam in the bushing, and also careful about the atomization of fuel by the sprayer and the exact adjustment of the pump assembly.

One winter day private 1st class L. Bykov was preparing the power plant for the start-up procedure. As prescribed, he opened the fuel feed cock , he used the hand pump to pump the feed system of the heater, and he let out the air. The fuel flowed normally into the sprayer. However, as he turned on electric motor MV-42, it started to spurt and pour over the floor. Efforts to adjust the pump assembly were useless. The assembly was dismantled. It was then discovered that the worm of the plunger and the adjusting rod had crumbled.

The importance of fuel during the startup of an engine can be judged by the following case. Junior Sergeant M. Zudin did not change the summer fuel when he prepared the engine for the autumn-winter season, hoping that it would be used up soon. The engine ran at low speed for a short time and then stopped. During a thorough investigation it was found that a fine filter was stopped up by parafin from the fuel which had thickened during the low temperature.

Also while Junior Sergeant M. Zudin was engaged in the maintenance of electric power station ESD-50 VS/230, the engine stopped unexpectedly. [illegible] from the

fuel system, but to no avail. [illegible] the following evening [illegible] pipe of the second section of the fuel pump was removed, a small piece of [illegible] was discovered under the pressure valve. As a result, the valve did not fit tightly into the seat, and the whole chamber of the pump was filled with air. When the shaving was removed, the engine ran without a hitch.

On The Book Shelf

"Disquieting Work"

"His misgivings were not ill founded. Shortly after 10:00 o'clock the border guards caught sight of the silhouette of a man. He was clambering up. Now it was only a matter of a few moments until the decisive action: the stranger could not pass the bushes near where the troops were occupying their position. So it happened. When the trespasser was within two meters of them, Belyayev shouted:

"Halt. Hands up!"

These lines are from the new book "Disquieting Work" (Politizdat, 1966, 464pp., 90 kopecks). It contains stories about the life of our border guards.

When you are within two steps of the border you experience a special feeling. On the other side are the same trees, bushes, and rocks; the same earth and ours. The silence at first "deafens" you--there is not a sound, not a rustle. It smells of pine needles, fungi, and raspberries. One

could paint a landscape or compose lyrical songs. But the border is the border. Here is the borderline between two worlds--socialist and capitalist. Pure poetry becomes stark reality.

The book begins with the story by Yevgeniy Ryabchukov called "The Pathfinder". The author describes the famous border guard, Hero of the Soviet Union, Nikita Fyedorovich Karatsupa.

"The yellow reed which was sticking harmlessly out of the water moved and started to rise. Behind it a wet gray man appeared. He maliciously spit out a pipe covered by the reed.

"Hands up," commanded Karatsupa.

"I surrender..."

This is only a single episode from the life of the pathfinder. More than once he happened into a face-to-face skirmish with armed trespassers, even with entire bands. Always Karatsupa emerged the victor.

The border guards fought courageously against superior numbers near Khasan Lake and on the Khalkin-Gol River. Lev Lin'kov describes this in his story "The Ridge of Aleksey Makhalin".

"The Japanese ran crouching with their rifles at tilt. One hundred twenty men with four machine guns against eleven border guards with nine rifles and two light machine guns...

"Don't shoot until ordered!", commanded Makhalin, not taking his eyes from his binoculars. "Everyone to his post!"

And our fighting men were victorious. . The Soviet Government has highly praised their heroic deed. The first Heroes of the Soviet Union among border guards were Makhalin, Vinogevitin, Teroshkin, Chernogyatko, and Batarshin.

During the Great Patriotic war, Soviet border guards were also the first to receive the blow of the Hitlerite divisions.

".x.There is a smell of burning and the acid odor of demolition explosives..", we read in the story "Near the Old Mill" by Vladimir Belyayev. "Uneasy, half clothed, with faces dirty with smoke and sweat, the border guards hid near the embrasure and in the semidarkness of the blockhouse...The mounting noise of the invasion cannot be muffled now as the gunfire moves southward." So the story begins, dividing life into peace and war.

It is very gratifying that our border guards give writers a wealth of material about the heroism of the Soviet soldier--defender of the Motherland. Many books have been written about military duty and the soldiers' life at their frontier posts. But unfortunately, few have been written about the soldiers at the traffic control points. Their work is very complex and responsible. You know the soldiers, sergeants, and officers of the traffic control points have to deal with foreigners every day. The latter masquerade at times as tourists and businessmen. The border guards have to find out, occasionally guess, the objectives or thoughts of this or that person who visits us.

The book "Disquieting Work" makes very interesting reading. I think people of all ages will like it.

Sergeant B. Sakharov